



THE SOUTH CAROLINA
DEPARTMENT of ADMINISTRATION

SAFETY PROGRAM:

WELDING PROGRAM

(09/23/02; Rev 8/15/2011, 8/14/2015)

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General

Welding joins pieces of metal by the use of heat, pressure or both. There are many types of welding. The Welders in Facilities Management typically use Arc Welding to include:

- “Stick” or shielded metal arc welding
- Gas-shielded methods of metal inert gas (MIG) and tungsten inert gas (TIG)

Cutting involves heating the metal with flame and directing a fine stream of pure oxygen along the line to be cut.

Brazing and soldering involves joining pieces of metal by melting a filler metal or alloy which has a lower melting point than the pieces being joined.



Welding



Cutting



Brazing



Soldering

Purpose

This program sets forth requirements to protect employees of the South Carolina Department of Administration engaged in welding, cutting, brazing or soldering (Hot Work) operations. Safe Hot Work operation is largely based on the employees' awareness of their surroundings and understanding the following chemical and physical hazards associated with hot work.

- Electric Shock
- Thermal Heat
- Fire and Explosion
- Visible Light and Ultra-Violet Radiation
- Asphyxiation (from Gases Displacing Oxygen or Decreased Oxygen Used in the Hot Work process)
- Toxic Fumes

Standards or Regulations

This Welding Program complies with the following (not all inclusive) list of safe working requirements of the Occupational Safety and Health Administration's (OSHA) General Industry and Construction standards on welding, cutting, and brazing and other related regulations, standards and guidance.

- Subpart Q – Welding, Cutting and Brazing; Title 29, Code of Federal Regulations (CFR), Parts 1910.251 - .255
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10133
- Subpart J – Welding and Cutting, 29 CFR 1926.350 - .354
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10914
- Subpart H – Hazardous Materials, 29 CFR 1910.101 – .104 (Compressed Gases, Acetylene, Hydrogen, Oxygen)
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9747
- 29 CFR 1910.94 Ventilation
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9734
- 29 CFR 1910.95 Occupational Noise Exposure
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9735
- Subpart D - Occupational Health and Environmental Controls, 29 CFR 1926
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10908
- Subpart I – Personal Protective Equipment, 29 CFR 1910.132 - .138
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10118
- 29 CFR 1926, Subpart E - Personal Protective And Life Saving Equipment
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10909
- 29 CFR 1926.406(c) – Electrical-Specific Purpose Equipment and Installations, Electric Welders-disconnecting means
- National Fire Protection Agency (NFPA) standard 51B (2009): Standard for Fire prevention During Welding, Cutting and Other Hot Work (Read only document available online through NFPA at http://www.nfpa.org/aboutthecodes/list_of_codes_and_standards.asp?cookie_test=1)
- ANSI Z49.1-2005 Safety in Welding, Cutting and Allied Processes
<http://www.aws.org/technical/facts/Z49.1-2005-all.pdf>

- Compressed Gas Association Pamphlet P-1 Safe Handling of Compressed Gases (CGA Pamphlet P-1-1965 is incorporated by reference in 29 CFR [1910.101\(b\)](#) but the pamphlet has been updated several times, i.e., P-1-2008)

Procedures

The procedures outlined in this program are to be followed whenever Department of Administration employees work with welding, cutting, brazing and soldering equipment. The following procedures establish uniform requirements for welding, cutting and brazing safety training, operation, and maintenance practices. These procedures are to be communicated to the affected employees and contractors and be in place to safeguard the health and safety of all employees and to protect property.

All Department of Administration employees that perform Hot Work operations shall be trained to recognize the hazards associated with their hot work, and to be informed and follow the necessary safety precautionary procedures per the applicable standards and this program.

All visitors and contractors to DOA facilities and job sites shall comply with the Welding Program or shall be denied access to these areas when Hot Work is in progress.

1. The Department of Administration Safety Office staff will monitor compliance with all federal and state regulations governing safety and health protection, especially OSHA Standard CFR 1910.252. This includes:

- Coordinate and maintain the written Welding Program
- Provide required safety training (hazard awareness and safe work procedures) related to Hot Work operations
- Maintain a list of locations of authorized Hot Work operations
- Monitor and update Department of Administration Supervisory Hot Work Permit files

2. Team Leaders are responsible for health and safety in their assigned work areas. To carry out this responsibility, the Team Leader will:

- Verify employees identified for Hot Work operations have the proper experience and training for their anticipated Hot Work job assignments;
- Confirm employees know and follow the safety and health procedures included in the welding, cutting and brazing operations training and regulations;
- Provide appropriate personal protective equipment (PPE) for Hot Work operations is available, maintained in good condition and properly used;
- Analyze each Hot Work operation for hazards then take steps to eliminate or control them.
- Require and complete a Hot Work Permit for welding off-site or in confined spaces.
- Supervise, monitor and overview each welding operation.

3. Each employee will:

- Read and comply with the Welding Program;
- Perform work safely; and
- Be aware of and alert for any unsafe conditions, correct them as able, and report them to his or her Supervisor, Team Leader and/or the Safety Office.

QUALIFIED AND AUTHORIZED WELDERS

Department of Administration employees identified to conduct Hot Work must have had specific training in and be knowledgeable about various means of thermal cutting, arc or oxygen-fuel gas welding and brazing practices and the procedures used within the Board to protect themselves, other employees and our facilities. An employee will be considered as a “qualified” Welder by the Team Leader based on their previous education, qualifications and job description and will be “authorized” for Hot Work once they have completed the Welding Safety course, offered by the Safety Office, and have read and understood this program.

Training for Welders will cover fire prevention and protection, special precautions, personal protective equipment (PPE), and hot work in confined spaces. All employees subject to performing Fire Watch for Hot Work operations will complete annual “Hands on” Fire Extinguisher Training. Employees shall be familiar with all relevant policies regarding Hot Work operations and understand regulations governing the practices followed at the Department of Administration.

Authorized Welders are able to identify existing and predict potential workplace conditions involved with Hot Work operations that are hazardous or dangerous to employees. Authorized Welders also have the power to take prompt corrective measures to eliminate these hazards and conditions. Only qualified and trained employees designated in writing (see Appendix C) as authorized Welders may conduct Hot Work operations in DOA facilities.

HOT WORK

Work with equipment that produces a spark or an open flame, or a process that generates excessive heat or produces a risk of fire is considered “Hot Work”. Work involving electric or gas welding or cutting are classified as Hot Work. Soldering and grinding (high heat), and brazing (open flame) are also considered Hot Work.

HOT WORK PERMIT

Hot Work requires a permit to establish authorization for all work that involves open flame or produces a spark or extreme heat. The permit (see Appendix A) must be completed by the supervisor to certify that the requirements contained in OSHA Standard 1910.252 have been

implemented prior to beginning the Hot Work operations. The permit also informs employees of proper procedures and needed equipment to address

Hot Work hazards such as:

- Fire, property or personal loss
- Explosion of compressed gases
- Flammable or combustible vapors, solids, liquids near the area of the Hot Work
- Processes involving oxygen-fuel gas, flames on torches
- Metal splatter
- Torch-based soldering
- Confined space issues

Precautions to avoid or minimize risks involved in hot work include but are not limited to:

- Fire prevention measures
- Personal protective equipment
- Preventative maintenance of specialized tools
- Warning labels and signs
- Ventilation

Hot Work may only be conducted at locations authorized by management. A FM Building Maintenance or Building Systems supervisor may authorize “off site” Hot Work operations on a case-by-case basis which requires a special Hot Work permit - the Off Site Welding Operations Authorization Form (Appendix A). Off-site locations shall have two (2) portable fire extinguishers available at all times. A copy of the permit must be kept on site until completion of the Hot Work operations. After completing the job, Hot Work permits will remain on file with the FM Building Maintenance or Building Systems office for a period of 5 years.

Pre-Approved Welding Locations

The following locations have been approved by the General Services Division, Facilities Management (FM) Section for the regular cutting, welding and brazing on steel or iron, or sporadic short term (i.e., one-time or very occasional incidents of 15 minutes or less) cutting, welding and brazing on aluminum, stainless steel or cast iron without the need for individual Hot Work Permits:

- 1) The FM Welding Shop at 927 (Rear) Main Street
- 2) The Welding Station at the FM Horticulture Shop at 2540 Bull Street

GENERAL HOT WORK OPERATIONS

TRAINING

Training for Hot Work operations, provided by the Safety Office, is to include training employees:

- Designated by management as “Authorized” to conduct Hot Work operations (see Appendix C)
- The correct procedures for inspecting, setting up and disassembling welding, cutting and brazing equipment, and Hot Work Permits for “off site” locations.
- The types of materials on which Hot Work operations are allowed are steel and iron. Sporadic short term welding on aluminum, stainless steel, cast iron or galvanized steel or iron is also permitted.
- The hazards to employees of basic Hot Work operations, safe operations, and means of protection before performing any Hot Work.
 - The correct procedures for preventing fires, especially areas where combustibles cannot be removed or covered for 35 feet in every direction.
 - The need for mechanical ventilation and proper procedures to remove lead based materials from the surfaces of cast iron, iron or steel and or galvanized steel/iron. Before welding on galvanized steel/iron, employees must remove the galvanization from the spot to be welded before commencing work.
 - The special hazards of Hot Work in confined spaces.

PERSONAL PROTECTIVE EQUIPMENT

Welding and cutting generate glaring visible light, intense heat, loud noise, toxic fumes, flying sparks (slag) as well as ultraviolet and infrared radiation that can result in severe burns, in many cases without prior warning, to the skin and eyes. Many of the substances in welding “smoke,” such as chromium, nickel, arsenic, asbestos, manganese, silica, beryllium, cadmium, nitrogen oxides, phosgene, acrolein, fluorine compounds, carbon monoxide, cobalt, copper, lead, ozone, selenium, and zinc can be extremely toxic with short and long term health effects to just about any part of the body, including the lungs, heart, kidneys, and central nervous system.

Personal protective equipment (PPE) should always be used along with, but never instead of, engineering controls and safe work practices. PPE is selected, based on exposure to hazards. Material Safety Data Sheets are useful to determine hazards and appropriate PPE. Welders and nearby workers should protect themselves with PPE:

- Welding Helmet or Face Shield with Goggles with appropriate filter lens (Appendix B)
- Fire Resistant Gauntlet Gloves
- High-Top Hard-Toed Rubber-Soled Shoes

- Flame-Retardant Coveralls or Flame-Resistant Long-sleeve shirts and trousers (collars should be kept buttoned; shirts and pants should not have cuffs)
- Leather Apron
- Hearing Protection (when air arcing and grinding or to keep spatter from getting in ears)

Extra protection should be used when conducting Hot Work overhead, such as:

- Fire-resistant Shoulder Covers, Capes or Aprons
- Hard Hat
- Leggings
- Hard Hats

Eye Protection

Eye protection such as a welder's helmet or a face shield and goggles is to be used for all Hot Work operations especially to prevent "welders flash" (damage to the eye's retina). At no time should the arc be observed by anyone without eye protection. Workers should use welding helmets with appropriate filter lenses, not hand-held screens. Use of eye protection with auto-darkening lenses is acceptable. The OSHA welding standard requires welding helmets, goggles or other eye protectors to contain special filter plates or lenses for workers exposed to arc welding or cutting processes, oxygen-fuel gas welding, brazing or cutting. See Appendix B of this program, Filter Lens Shade Numbers, to select the proper shade lens required for the specified Hot Work operation.

Employees shall use shielding (barriers / screens) to protect other people in the work area and passersby from the welding arc, heat and hot spatter.



Welding Helmet, Gloves &
Fire-Resistant Coverall



Welding Screen

Material Safety Data Sheets

Material Safety Data Sheets (MSDS) for any material that is to be welded on or with must always be reviewed prior to conducting Hot Work operations. The product MSDS will indicate health effects from welding on the chemical ingredients and safety precautions such what PPE to

wear, other protective measures and first aid procedures. All welding gas hazards, fumes, and vapors that come from metal, paints, fluxes, degreasers, rods during welding are covered by the OSHA HAZCOM standard. All containers of filler metal, electrodes and flux materials should carry warning labels alerting the welder that welding produces hazardous fumes and gases. Base metals that contain or are coated with toxic materials (such as paints, lead, mercury) should also be clearly labeled. The Department of Administration requires each work unit to identify such hazardous materials and obtain that product's MSDS. All MSDSs are available to any Department of Administration employee through SiteHawk, our web-based MSDS management system. Workers must have safety data sheets readily available for the materials used, such as:

- Stainless steel contains nickel and chromium.
- Mild steel (red iron) and carbon steel contain manganese.
- Galvanized metal contains zinc.
- Lead and cadmium are found in paints.
- Carbon monoxide can form when carbon dioxide is used for shielding and from oxyacetylene welding.
- The arc from metal inert gas (MIG) and tungsten inert gas (TIG) welding can form ozone and nitrogen oxides.

Respiratory Protection

The content of the welding rods, coatings, filler metals, and base materials can greatly impact health. Hazardous fumes, vapors, gases, or dust can be a side product of welding depending on the metals and/or coatings and the type of welding or cutting involved.

- Zinc Oxide fumes from alloys and coatings
- Cadmium fumes from this rust-preventive coating on steel
- Beryllium fumes from this alloying element with copper and other base metals
- Iron Oxide fumes from this alloying element in steel manufacture
- Mercury vapors from metal coats to prevent rust or inhibit foliage growth (marine paints)
- Lead Oxide fumes from lead-bearing alloys or metals whose surfaces have been painted with lead-based paint
- Fluoride compounds are found in the coatings of several types of fluxes used in welding
- Chlorinated Hydrocarbons from degreasing or other cleaning agents generate highly toxic and irritating phosgene gas; arc welding should never be performed within 200 feet of degreasing equipment or solvents
- Carbon monoxide is a gas usually formed by the incomplete combustion of various fuels
- Ozone (O₃) and Nitrogen Oxides are produced by ultraviolet light especially from gas metal arc welding, gas tungsten arc welding and plasma arc cutting
- Chromium, Nickel and Manganese in fumes

Employees shall use the safest welding method for the job. Stick welding makes much less fume than flux core welding. Use cadmium-free silver solders. Use welding rods that produce a low fume. Use asbestos-free electrodes, gloves and hot pads.

Hot Work should be done where good ventilation is available so as not to expose any employee to toxic substances. Position yourself so that your head is not in the fumes. Use local-exhaust ventilation to remove fumes and gases at their source in still air. The exhaust hood opening should be 4" to 6" from the fume source. 90 percent of the fume can come from the rod. Welding guns that extract fumes can capture 95 percent of the fume. Use air blowers to blow fumes away from you when working indoors and stay upwind of the source when outdoors.

According to a survey and air monitoring jointly conducted by Safety and an OSHA Industrial Hygienist Hot Work operations normally conducted by Department of Administration employees do not require the use of a respirator. However, should the MSDS for a material used in Hot Work require a respirator, the OSHA Industrial Hygienist indicated that sporadic short term projects could be done without wearing a respirator. Such projects are to be discussed with and approved by the Safety Office prior to the operation.

Galvanization (Zinc Coatings)

Zinc is used in the manufacture of brass, galvanized metals (iron, steel or aluminum), and various other alloys. Steel and iron are often galvanized to protect against corrosion through the process of electroplating a thin shiny layer of zinc. A similar hot dip zinc coating process produces a much thicker, durable coating with a matte gray finish typically for outdoor use.

Inhalation of zinc oxide fumes can occur when welding or cutting on zinc-coated metals. Exposure to these fumes is known to cause metal fume fever. Symptoms of metal fume fever are very similar to those of common influenza. They include fever (rarely exceeding 102° F), chills, nausea, dryness of the throat, cough, fatigue, and general weakness and aching of the head and body. The victim may sweat profusely for a few hours, after which the body temperature begins to return to normal. The symptoms of metal fume fever have rarely, if ever, lasted beyond 24 hours.

If zinc is present, such as in the form of galvanization, or is suspected, Department of Administration employees must remove the galvanization from the spot to be welded (i.e., the surfaces of cast iron, iron or steel and or galvanized steel/iron) before commencing work. Otherwise, point of operation mechanical ventilation (movable exhaust or hood) is recommended.

Lead

The welding or cutting of lead-bearing alloys or metals whose surfaces have been painted with lead-based paint can generate lead oxide fumes. Inhalation and ingestion of lead oxide fumes and other lead compounds will cause lead poisoning. Symptoms include metallic taste in the mouth, loss of appetite, nausea, abdominal cramps, and insomnia. In time, anemia and general weakness, chiefly in the muscles of the wrists, develop. Lead adversely affects the brain, central nervous system, circulatory system, reproductive system, kidneys, and muscles.

If lead is present, such as in the form of paint or a coating, or is suspected, employees must remove the paint/coating from the spot to be welded by a manual operation, such as by hand sanding, before commencing work. Otherwise, point of operation mechanical ventilation (movable exhaust or hood) is recommended.

Electrical Hazard

Welding has a danger of electric shock especially when working in wet areas. Gloves and insulation on electrode holders should always be kept dry. The Welder should also wear rubber-soled shoes, and use an insulating layer such as a dry board or rubber mat on surfaces that conduct electricity. The piece being welded and the frame of electrically powered machines must be grounded.

Confined Spaces

Dangerous concentrations of toxic fumes and gases can quickly build up in a small enclosed work space. High concentrations of some fumes and gases can be explosive. The welding process can also use up and displace oxygen in the air. Therefore, adequate ventilation is essential. All Hot Work operations carried on in confined spaces shall have adequate mechanical ventilation supplying fresh outside air (never use oxygen for ventilation) to prevent the accumulation of toxic materials or possible oxygen deficiency. If possible, the gas cylinders and welding power sources should be securely positioned outside of the confined space. All pipes, ducts and power sources connected to the space but not necessary to the Hot Work operation should be shut off, disconnected and Lockout-Tagout applied. Hot Work inside any confined space makes it a Permit Required Confined Space which includes having an Attendant outside ready to perform an extraction rescue and fight a fire from the outside. Hot Work in any confined space requires both a Hot Work Permit (see Attachment A to this program) and a Permit for Confined Space Entry.

FIRE PREVENTION DURING HOT WORK OPERATIONS

Welding and metal cutting operations produce molten metal, sparks, weld spatter, slag and hot work surfaces. All of these situations can cause fires.

Hot Work should only be conducted in areas free of combustibles (trash, wood, paper, textiles, plastics, chemicals, flammable dust, liquids and gases and vapors that can travel several hundred feet). OSHA 29 CFR 1910.252 addresses fire hazards and the methods which can be used to control them. If the object to be welded or cut cannot readily be moved to a safe location, all movable fire hazards in the vicinity shall be removed to a safe place. Those fire hazards within a 35 foot radius that cannot be removed shall be covered with flame-resistant materials.

Before welding, containers that have contained flammable/combustible materials must be thoroughly cleaned with an inert (non-reactive) gas.

Fire Watch

A “Fire Watch” is designated by management for all Hot Work operations. The Fire Watch is an employee trained on the specific fire hazards for that job and location, and knows where fire prevention equipment is located and how to use it. The Fire Watch is responsible to:

- Have proper extinguishing equipment readily available on site, immediately available for use, and trained in its use
- Provide additional safeguards against fire during and after the Hot Work operations.
- Maintained surveillance of the work area during the work and for at least 30 minutes following completion of the work to detect and extinguish possible smoldering fires
- Use the fire extinguisher/equipment in case of an emergency and to summon help if needed

A Fire Watch is required in situations where:

- Other than a minor fire might develop
- Combustible material is located within 35 feet of the work
- Combustible material is located more than 35 feet away but can be easily ignited by sparks
- Wall or floor openings within 35 feet expose combustible material in adjacent areas or concealed wall or floor spaces.
- Combustible materials are located on the opposite side of surfaces being welded.

Hot Work operations will not take place in the event that existing fire suppression (sprinkler) systems are inoperable without express written authorization from the Supervisor.



Fire Blanket to cover combustibles that can't be moved



Fire Watch has extinguisher on site immediately ready

COMPRESSED GASES

Gas welding and flame cutting use oxygen and a fuel gas such acetylene, hydrogen or propane to produce heat. The fuel gas and oxygen are stored in compressed gas cylinders. Oxygen alone will not burn or explode but can make other materials and gases very explosive, and the fuel gases can be explosive. The gas cylinders are under high pressure and can also rupture and explode. The following are general precautions when using compressed gases:

- Only pressure regulators designed for the gas being used should be fitted to the cylinder
- Check cylinders, pressure relief valves, blow pipes, hoses, fittings and lines before and during welding to be clean and in good condition
- Replace damaged and defective parts such as worn, leaking or burned hoses
- Be aware of backfires and flashbacks (caused by defective or incorrectly operated equipment)
 - To prevent flashbacks use the correct lighting up procedure; ensure the blowpipe is fitted with spring-loaded non-return valves to prevent a backflow of gas into the hoses; use the correct gas pressure and nozzle size for the job; and maintain equipment in good condition
 - If a backfire occurs, shut of the blow-pipe valves, oxygen first and then the fuel gas; shut off the oxygen and fuel gas cylinder valves; cool the blow-pipe with water; and check the equipment for damage, especially the nozzle
- Close cylinder valves when work is finished and release pressure in regulators and hose lines before being moved or placed in storage
- All gas cylinders are to have caps when not in use
- Store cylinders upright and secure them so they will not fall over
- Store oxygen and fuel gas cylinders in separate dry and well ventilated fire resistant locations away from heat and sunlight, and at least 20 feet away from flammable materials such as paint, oil or solvents



Cylinders with Caps, Stored Upright and Secured in storage area



or secured on Welding Cart

WARNING SIGNS

OSHA 29 CFR 1910.145 requires signs be posted around the Hot Work area to be within visual eyesight to warn workers and passersby of hazard exposures that may lead to accidental injury, especially eye injury from looking at the arc unprotected, and serve as a reminder for the need to wear PPE. Example:



Appendix A

Off Site Hot Work Operations Authorization Form

TEAM: FM Building Systems _____

FM Building Maintenance _____

Other: _____

Dates of Welding Operation:

Begin Date: _____ Time: _____ AM PM

End Date: _____ Time: _____ AM PM

Location of Hot Work Operation: _____

Work Order Number: _____

Supervisor's Name: _____

Welder's Name: _____

Name of Fire Watch: _____

1. Building Materials Checked for:	YES	NO
<p>Asbestos: Check the building's Asbestos Operations and Maintenance Manual or Asbestos Summary Log to determine if materials being worked on contain asbestos. Is asbestos present?</p> <p>1) If yes (asbestos present), STOP! Contact your Supervisor and/or the FM Asbestos Program Control Manager.</p> <p>2) If no (no asbestos containing materials involved), you may proceed with the assigned Hot Work operations.</p>		
<p>Lead: Is lead present?</p> <p>If lead is suspected or detected, obtain direction from your Team Leader and follow the Lead Program.</p>		
<p>Gas Lines: If gas lines are present, has each been made safe using proper LOCKOUT / TAGOUT and purge procedures?</p>		
<p>Galvanized Coating (i.e., Steel, Iron or Aluminum): Before welding, has the galvanized layer been removed for spots to be welded?</p>		

2. Mechanical Ventilation: Is mechanical ventilation required for the Hot Work operation?		
3. Combustibles: Has combustible materials within 35 feet in every direction of the Hot Work operation been removed and/or protected with fire covers?		
4. Portable Fire Extinguishers: Are two extinguishers at the Hot Work site?		
5. Fire Alarms: If present, are fire alarms in working order?		
6. Smoke Detectors/Duct Smoke Detectors: If present, are smoke detectors disabled?		
7. PPE: Do the Welders and Fire Watch have appropriate PPE for the Hot Work operation?		
8. Safe Operation: Has welding, cutting, brazing or soldering equipment been checked for safe operation?		
9. Fire Watch: On site during the work and for at least 30 minutes after project completion to ensure no ignition from embers or slag		

Supervisor Authorizing Operation: _____

(Signature)

Date: _____

This form will be maintained by the Supervisor and another copy attached to the work order at the work site. The Hot Work Permit will be made available to OSHA or the Safety Office upon request.

Appendix B

Filter Lens Shade Numbers for Protection Against Radiant Energy

<u>Hot Work Operation</u>	<u>Number Shade</u>
Shielded Metal-Arc Welding (SMAW) using 1/16-, 3/32-, 1/8-, and 5/32-inch diameter electrodes	10
Gas-Shielded Arc Welding (nonferrous) using 1/16-, 3/32-, 1/8-, and 5/32-inch D. electrodes	11
Gas-Shielded Arc Welding (ferrous) using 1/16-, 3/32-, 1/8-, and 5/32-inch D. electrodes	12
Shielded Metal-Arc Welding (SMAW) using 3/16-, 7/32-, and 1/4-inch D. electrodes	12
5/16-, and 3/8-inch diameter electrodes	14
Atomic Hydrogen Welding	10-14
Carbon-Arc Welding (CAW)	14
Soldering	2
Torch Brazing	3 or 4
Light cutting, up to 1-inch	3 or 4
Medium cutting, 1-inch to 6-inches	4 or 5
Heavy cutting, over 6 inches	5 or 6
Gas welding (light), up to 1/8-inch	4 or 5
Gas welding (medium), 1/8-inch to 1/2-inch	5 or 6
Gas welding (heavy), over 1/2-inch	6 or 8

Appendix C

Authorized Welders and Fire Watch

GENERAL SERVICES DIVISION

The following employees are authorized Welders:

EMPLOYEE	TEAM	WELDING TRAINING
ADAMS, TALLY	FM Building Maintenance	9/27/2002
CRAWFORD, WILLIAM	FM Building Maintenance	4/16/2004
DOWD JR., JAMES	FM Building Maintenance	9/12/2002
FIELDS, HARRY	FM Building Systems	9/27/2002
HONEYCUTT, RONNIE	FM Energy-Environmental	9/12/2002
HUFF, JOHN ROBERT	FM Building Systems	9/12/2002
JOHNSON, JAMES E	FM Building Maintenance	9/12/2002
LEWIS, RODNEY	FM Building Systems	9/27/2002
LOWMAN, MARVIN KENNY	FM Building Maintenance	4/16/2004
PINCKNEY, TOMMY	FM Building Maintenance	10/8/1997
PRESSLEY, CHRIS	FM Capitol Complex	9/12/2002
SMITH, C DALE	FM Statehouse Maintenance	9/12/2002
STEWART, CHARLES	FM Building Systems	10/6/2005
TAYLOR, RONNIE	FM Building Systems	10/6/2005
WAITS, ROGER	FM Horticulture	9/12/2002

The following employees are designated to do Fire Watch:

EMPLOYEE	TEAM	FIRE WATCH EXTINGUISHER TRAINING (Annual)
ADAMS, TALLY	FM Building Maintenance	6/9/2011
CRAWFORD, WILLIAM	FM Building Maintenance	6/9/2011
DOWD JR., JAMES	FM Building Maintenance	6/9/2011
FIELDS, HARRY	FM Building Systems	6/9/2011
HONEYCUTT, RONNIE	FM Energy-Environmental	
HOOK, CHARLES D	FM Building Systems	6/9/2011
HUFF, JOHN ROBERT	FM Building Maintenance	6/9/2011
JOHNSON, JAMES E	FM Building Maintenance	6/9/2011
LEWIS, RODNEY	FM Building Systems	6/9/2011
LOWMAN, MARVIN KENNY	FM Building Maintenance	6/9/2011
MEFFORD, TIMOTHY	FM Statehouse Maintenance	6/9/2011
PINCKNEY, TOMMY	FM Building Maintenance	
PRESSLEY, CHRIS	FM Capitol Complex	
SMITH, C DALE	FM Statehouse Maintenance	6/9/2011
STEWART, CHARLES	FM Building Systems	6/9/2011
TAYLOR, RONNIE	FM Building Systems	6/9/2011
WAITS, ROGER	FM Horticulture	6/9/2011

As of 6/15/11